**Data Structure Description**

Project TrAn-SiSS

# **Subsystems:**

1. **Traffic Signal Analysis System**
   1. Traffic Signal Junction
   2. Lane
   3. Street
   4. Traffic Signal Light
   5. Map Extension List
2. **Traffic Simulation System**
   1. Vehicle
   2. Direction

# **1.1. Traffic Signal Junction (traffic\_sig\_jn)**

**Description** :

Nodes which together form a graph data structure and contain the traffic signal controls at the lane junctions.

\*This structure will be interconnected to neighbouring traffic signal nodes (in the form of a *graph data structure*).

**Datatype Name** : struct traffic\_sig\_jn

**Alternate Name**  : traffic\_sig\_jn\_t

|  |  |  |  |
| --- | --- | --- | --- |
| Member Variable | Datatype | Type Description | Description |
| name | string (char \*) | char array | Name of the traffic signal node |
| id | string ( char \*) | char pointer | Unique ID code for the traffic signal node. |
| type | string [10] | char array | Typecode of traffic signal junction (according to the number of adjacent TSJ nodes). |
| coord | struct coordinate | object of coordinate | Stores the coordinates (position) of the TSJ on the screen |
| sty | struct style | object of style | Stores the styling properties of the TSJ. |

# **1.2. Lane (lane)**

**Description** :

Queue of vehicle (struct vehicle data type) which would contain all the vehicles queues in a lane.

\*This structure will behave as a queue of pointers of the structure *struct vehicle* implemented as an array of predefined size (which is the maximum capacity of the lane).

**Datatype Name** : struct lane

**Alternate Name**  : lane\_t

|  |  |  |  |
| --- | --- | --- | --- |
| Member Variable | Datatype | Type Description | Description |
| id | string | char array | Unique ID code for the lane |
| queue | struct vehicle \*\* | dynamic array of pointers (using double pointers) | Queue of pointers of vehicle |
| front | int | integer numeric | The position just 1 before the position of the first vehicle. |
| rear | int | integer numeric | The position of the last vehicle. |
| capacity | int | integer numeric | Maximum number of vehicles (capacity) that can be on the lane. |
| curr\_vehicles | int | integer numeric | Number of vehicles currently present on the lane. |
| type | string ( char \*) | char pointer | Type of lane.(Lane Number/Position) |
| traffic\_status | float | percentage | Percentage of the traffic present on the lane. |
| coord | struct coordinate | object of coordinate | Stores the coordinates (position) of the lane on the screen |
| sty | struct style | object of style | Stores the styling properties of the lane. |

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# **1.3. Street (street)**

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# **Description** : Contains the lanes between two Traffic Signal Junction Nodes

# **Datatype Name** : struct street

# **Alternate Name** : street\_t

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| --- | --- | --- | --- |
| Member Variable | Datatype | Type Description | Description |
| name | string | char array | Name of the street |
| id | string ( char \*) | char pointer | Unique ID code for the street |
| type | string ( char \*) | char pointer | Street type description |
| nol[2] | int [] | integer numeral array | Number of Lanes from*nol[0] :* TSJ 1 -to-> TSJ 2*nol1] :* TSJ 2 -to-> TSJ 1 |
| lanes[2] | struct lane \*\* [] | dynamic array of pointers (using double pointers) | Lanes leading from*lanes[0] :* TSJ 1 -to-> TSJ 2*lanes[1] :* TSJ 2 -to-> TSJ 1 |
| tsj[2] | struct traffic\_signal\_jn \* [] | array of pointers | Pointer to TSJ’s the street is joined to.*tsj[0] :* ->TSJ 1*tsj[1] :* ->TSJ 2 |
| tsl[2] | struct traffic\_light \* [] | pointer | Pointer of TSL’s for the corresponding TSJ’s the street is joined to.*tsl[0] :* ->TSL 1 (2->1)*tsl[1] :* ->TSL 2 (1->2) |
| c1 | struct coordinate | object of coordinate | Stores the coordinates (position) of the street on the screen |
| c2 | struct coordinate | object of coordinate | Stores the coordinates (position) of the street on the screen |
| sty | struct style | object of style | Stores the styling properties of the street. |

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# **1.4. Traffic Signal Light (traffic\_light)**

**Description** : Traffic signal lights (Red, Yellow & Green ) control.

**Datatype Name** : struct traffic\_light

**Alternate Name**  : traffic\_light\_t

|  |  |  |  |
| --- | --- | --- | --- |
| Member Variable | Datatype | Type Description | Description |
| id | string | char array | Unique ID code for the traffic light |
| timer | int | integer numeral | TImer set for this tsl for the next analysis |
| red | int | boolean(0,1) | Red - On/Off |
| yellow | int | boolean(0,1) | Yellow - On/Off |
| forward | int | boolean(0,1) | Green (Forward) - On/Off |
| left | int | boolean(0,1) | Green (Left) - On/Off |
| right | int | boolean(0,1) | Green (Right) - On/Off |
| coord | struct coordinate | object of coordinate | Stores the coordinates (position) of the TSL on the screen |
| style | struct style | object of style | Stores the styling properties of the TSL. |

# **2.1. Vehicle(vehicle)**

**Description** : Contains data variables describing the vehicle object.

**Datatype Name** : struct vehicle

**Alternate Name**  : vehicle\_t

|  |  |  |  |
| --- | --- | --- | --- |
| Member Variable | Datatype | Type Description | Description |
| name | string | char array | Name of the vehicle |
| id | string ( char \*) | char pointer | Unique ID code for the vehicle |
| speed | int | integer numeric | Speed of the vehicle |
| type | string ( char \*) | char pointer | (\*Optional Initially) Type of the Vehicle(car/truck/bike etc.) |
| source | struct map\_extn \* | pointer | Pointer to the starting map extension node |
| dest | struct map\_extn \* | pointer | Pointer to the ending map extension node |
| directions | struct route | object | Queue containing the route the vehicle has to follow to reach its destination |
| vehicle\_no | string | char array | Vehicle licence plate number. |
| priority\_status | int | integer numeric | (\*Optional) Priority status of the vehicle.  (VIP Vehicles) |
| coord | struct coordinate | object of coordinate | Stores the coordinates (position) of the Vehicle on the screen |
| sty | struct style | object of style | Stores the styling properties of the Vehicle. |

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# **2.2. Route (route)**

**Description** : Queue of steps for taking the route from the starting to the end map extension node.

**Datatype Name** : struct route

**Alternate Name**  : route\_t

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| --- | --- | --- | --- |
| Member Variable | Datatype | Type Description | Description |
| no\_of\_steps | int | integer numeric | Number of steps to be taken to reach from the |
| steps | string ( char \*) | dynamic array of char | Queue of steps containing the junctions id’s through which the vehicle has to pass to reach the destination node. |
| front | int | integer | Front element of queue. |
| rear | int | integer | Rear element of queue. |